5.1 Specifying a problem, planning and collecting data

Outcome	3a G	4c F	4b F	4a F	5c E	5b E	5a E	6c D	6b D
5.1a Sampling methods		suggest possible answers, given a question that can be addressed by statistical methods					discuss a problem that can be addressed by statistical methods and identify related questions to explore		
5.1b Data reliability				decide which data would be relevant to an enquiry and possible sources				decide which data to collect to answer a question, and the degree of accuracy needed	identify possible sources; consider appropriate sample size
5.1c Data collection methods		Construct frequency tables for gathering discrete data, grouped where appropriate in equal class intervals		plan how to collect and organise small sets of data from surveys and experiments by designing data collection sheets or questionnaires to use in a simple survey			plan how to use the data	construct frequency tables with equal class intervals for gathering continuous data and two way tables for recording discrete data	
5.1d Gathering data			collect small sets of data from surveys and experiments, as planned					collect data using a suitable method (eg observations, controlled experiment, data logging using ICT)	

5.1 Specifying a problem, planning and collecting data

6a D	7c C	7b C	7a B	8c B	8b A	8a A	EP A*
suggest a problem to explore using statistical methods, frame questions and raise conjectures		independently devise a suitable plan for a substantial statistical project and justify the decisions made	consider possible difficulties with planned approaches, including practical problems	adjust the project plan accordingly	select and justify a sampling scheme and a method to investigate a population, including random and stratified sampling		
discuss how different sets of data relate to the problem	identify possible primary or secondary sources	determine the sample size and most appropriate degree of accuracy	identify possible sources of bias and plan how to minimise it		deal with practical problems such as non-response or missing data		understand how different methods of sampling and different sample sizes may affect the reliability of conclusions drawn
design a survey or experiment to capture the necessary data from one or more sources	design, trial and if necessary refine data collection sheets	construct tables for gathering large discrete and continuous sets of raw data, choosing suitable class intervals; design and use two-way tables	break a task down into an appropriate series of key statements (hypotheses), and decide upon the best methods for testing these			identify what extra information may be required to pursue a further line of enquiry	
gather data from specified secondary sources, including printed tables and lists, and ICT-based sources, including the Internet		gather data from primary and secondary sources, using ICT and other methods, including data from observation, controlled experiment, data logging, printed tables and lists					

5.2 Processing and representing data

Outcome	3a G	4c F	4b F	4a F	5c E	5b E	5a E	6c D	6b D
5.2a Calculating statistics				for small sets of discrete data, find the mode, median and range, and the modal class for grouped data	for small sets of discrete data, calculate the mean using a calculator for a larger number of items		for small sets of discrete data, calculate the mean, including from a simple frequency table, using a calculator for a larger number of items	calculate statistics for sets of discrete and continuous data, including with a calculator and spreadsheet	recognise when it is appropriate to use the range, mean, median and mode and, for grouped data, the modal class
5.2b Using moving averages to predict									
5.2c Representing data using charts	construct bar-line graphs	construct, on paper and using ICT, graphs and diagrams to represent data		construct frequency diagrams for grouped discrete data	construct simple pie charts			construct bar charts and frequency diagrams for discrete and continuous data; construct stem-and-leaf diagrams	construct simple line graphs for time series
5.2d Data handling cycle									

5.2 Processing and representing data

6a D	7c C	7b C	7a B	8c B	8b A	8a A	EP A*
	calculate statistics and select those most appropriate to the problem or which address the questions posed.	use an appropriate range of statistical methods to explore and summarise data, including estimating and finding the mean, median, quartiles and interquartile range for large data sets (by calculation or using a cumulative frequency diagram)				use an appropriate range of statistical methods to explore and summarise data, including calculating and appropriate moving average for a time series	
							use a moving average to identify seasonality and trends in time series data, using them to make predictions
construct graphical representations, on paper and using ICT, and identify which are most useful in the context of the problem; construct pie charts for categorical data; construct simple scatter graphs	construct scatter graphs to develop further understanding of correlation	select, construct and modify, on paper and using ICT, suitable graphical representations to progress an enquiry and identify key features present in the data	construct line graphs for time series	construct scatter graphs and lines of best fit (by eye); construct box plots	construct cumulative frequency tables and diagrams	construct histograms for grouped continuous data with equal class intervals	construct histograms, including those with unequal class intervals

5.3 Interpreting and discussing results

Outcome	3a G	4c F	4b F	4a F	5c E	5b E	5a E	6c D	6b D
5.3a Interpretation of charts					interpret diagrams and graphs (including pie charts), and draw simple conclusions based on the shape of graphs and simple statistics for a single distribution			interpret tables, graphs and diagrams for discrete and continuous data, relating summary statistics and findings to the questions being explored	have a basic understanding of correlation
5.3b Correlation									
5.3c Comparison of distribution					compare two simple distributions using the range and one of the mode, median or mean		compare two distributions using the range and one or more of the mode, median and mean		
5.3d Reporting on statistical enquiries						write a short report of a statistical enquiry, including appropriate diagrams, graphs and charts, using ICT as appropriate	justify the choice of presentation		write about and discuss the results of a statistical enquiry using ICT as appropriate

5.3 Interpreting and discussing results

6a D	7c C	7b C	7a B	8c B	8b A	8a A	EP A*
interpret graphs and diagrams and make inferences to support or cast doubt on initial conjectures		analyse data to find patterns and exceptions, and try to explain anomalies	include social statistics such as index numbers, time series and survey data			interpret and use cumulative frequency diagrams to solve problems	use, interpret and compare histograms, including those with unequal class intervals
appreciate that correlation is a measure of the strength of association between two variables	distinguish between positive, negative and zero correlation, using lines of best fit		appreciate that zero correlation does not necessarily imply 'no relationship', but merely 'no linear relationship'				
compare two or more distributions and make inferences, using the shape of the distributions and appropriate statistics				compare two or more distributions and make inferences, using the shape of the distributions and measures of average and spread, including median and quartiles			
justify the methods used	review interpretations and results of a statistical enquiry on the basis of discussions	communicate these interpretations and results using selected tables, graphs and diagrams	examine critically the results of a statistical enquiry	justify choice of statistical representations and relate summarised data to the questions being explored		recognise the limitations of any assumptions and the effects that varying the assumptions could have on the conclusions drawn from data analysis	

5.4 Probability

Outcome	3a G	4c F	4b F	4a F	5c E	5b E	5a E	6c D	6b D
5.4a Interpretation of probability					use vocabulary and ideas of probability, drawing on experience			interpret the results of an experiment using the language of probability; appreciate that random processes are unpredictable	
5.4b The probability scale					understand and use the probability scale from 0 to 1	find and justify probabilities based on equally likely outcomes in simple contexts; identify all the possible mutually exclusive outcomes of a single event		know that if the probability of an event occurring is p then the probability of it not occurring is 1 − p; use diagrams and tables to record in a systematic way all possible mutually exclusive outcomes for single events and for two successive events	know that the sum of probabilities of all mutually exclusive outcomes is 1 and use this when solving problems
5.4c Estimated probabilities							estimate probabilities by collecting data from a simple experiment and recording it in a frequency table; compare experimental and theoretical probabilities in simple contexts		compare estimated experimental probabilities with theoretical probabilities, recognising that: if an experiment is repeated the outcome may, and usually will, be different increasing the number of times an experiment is repeated generally leads to better estimates of probability

5.4 Probability

6a D	7c C	7b C	7a B	8c B	8b A	8a A	EP A*
	interpret results involving uncertainty and prediction			use tree diagrams to represent outcomes of two or more events and to calculate probabilities of combinations of independent events		use tree diagrams to represent outcomes of compound events, recognising when events are independent and distinguishing between contexts involving selection both with and without replacement	
identify all the mutually exclusive outcomes of an experiment					know when to add or multiply two probabilities: if A and B are mutually exclusive, then the probability of A or B occurring is P(A) + P(B), whereas if A and B are independent events, the probability of A and B occurring is P(A) × P(B)	recognise when and how to work with probabilities associated with independent and mutually exclusive events when interpreting data	
		compare experimental and theoretical probabilities in a range of contexts; appreciate the difference between mathematical explanation and experimental evidence	understand relative frequency as an estimate of probability and use this to compare outcomes of experiments	understand that if an experiment is repeated, the outcome may – and usually will – be different, and that increasing the sample size generally leads to better estimates of probability and population parameters			